

**Wyland Lake**

**Kosciusko County**

**Fish Management Report**

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## EXECUTIVE SUMMARY

- Wyland Lake is a 6-acre natural lake located on the Tri-County Fish and Wildlife Area near North Webster. Maximum depth is 36 ft and average depth is 16 ft. Surrounding land is wooded and the shoreline is undeveloped.
- To obtain current information on the fish population and water quality at Wyland Lake, a general fish survey was conducted August 18-19, 2008. Sampling effort consisted of 0.2 h (1 lap around lake) of nighttime electrofishing, two gill net lifts and two trap net lifts.
- During the survey, 157 fish weighing 21 pounds were collected. Bluegills were first by number (64%) and weight (39%). Redear were second by number (10%) and fourth by weight (7%). Largemouth bass were third by number (8%) and ranked second by weight (30%). Additional species collected included yellow bullhead, lake chubsucker, warmouth, golden shiner, a brown bullhead, a hybrid sunfish, and a pumpkinseed.
- Submersed vegetation was found at 100% of the littoral sites, and was present to 20 feet. The overall mean rake score was 3.80. Coontail was the dominant plant and was found at every sample site. Bladderwort was the second most dominant plant and was found at 30% of the sites. Elodea, water-stargrass, largeleaf pondweed, and filamentous algae were also collected.
- Bluegills were as old as age-6 and growth was average when compared to other nearby lakes. Too few redear or largemouth bass were captured to obtain accurate age and growth information.
- Though few fish were captured at Wyland Lake, the recent survey illustrates that there has been a shift in species composition since the winter rotenone application project in 1993. The appearance of bass in greater numbers and the collection of larger bluegill may suggest that the native sportfish population community is improving at Wyland Lake. It is recommended that the DFW continue to periodically monitor Wyland Lake to determine if native sportfish populations or water quality have improved.
- It is recommended that DFW continue annual trout stockings to provide more sportfishing opportunity while emphasizing Wyland Lake's put and take trout fishery.

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## INTRODUCTION

Wyland Lake is a 6-acre natural lake located on the Tri-County Fish and Wildlife Area near North Webster. Maximum depth is 36 ft and average depth is 16 ft. Surrounding land is wooded and the shoreline is undeveloped.

Before 1962, no information was available on the fish populations at Wyland Lake. Surveys in the 1962 and 1970 indicated the lake's fish community was dominated by small bluegills, bullheads, and lake chubsuckers. In 1971, rotenone was applied at 2 ppm to eradicate the fish, and the lake was subsequently restocked with bass and bluegill. Unfortunately, good fishing never developed. In 1975, trout stockings were initiated to utilize the coldwater habitat present at middle depths during winter and spring months and to provide more diverse sportfishing for anglers. From 1979-1981, surveys determined that anglers caught up to 75% of the trout, typically within the first few weeks of stocking.

From 1975-93, water quality parameters such as dissolved oxygen, temperature, and water clarity were checked periodically to determine if trout could survive through the summer months (Table 1). It was concluded that water clarity and quality were deteriorating, and suitable trout habitat (Dissolved oxygen at or above 5.0 ppm in water less than 70 degrees F) was no longer present by late summer. Though the cause of the decline was unknown, it was hypothesized that planktivorous fish had become overpopulated and were overgrazing zooplankton. This would theoretically cause phytoplankton to flourish, reducing water clarity and oxygen concentrations in deeper water (DeMott, 1990).

To remove these planktivorous fish and create a trout-dominated fishery, 100 gallons of rotenone was applied in 1989. However, many fish survived the application, and consequently, 180 gallons of rotenone was applied in December 1991 to again attempt to eradicate planktivorous fish as well as test the effectiveness of high-dose (5 ppm) winter rotenone treatments. No fish except trout were stocked between 1989 & 1993 or subsequently. In 1993, it was determined that the winter application of increased amounts of rotenone were no more effective than fall applications at normal rates. Although oxygen concentrations were higher at greater depths in 1993 (Table 1), trout habitat was still not restored and overall water quality did not improve. Therefore, it was

determined that factors other than planktivorous fish were contributing to low oxygen levels. However, because of the success of trout stocking at Wyland Lake and the efficiency of anglers to catch most of these fish within weeks of stocking, the program continued. To obtain current information on the fish population and water quality at Wyland Lake, a general fish survey was conducted August 18-19, 2008.

## METHODS

Fish sampling effort included 0.2 h of pulsed DC electrofishing (504V) with two dip-netters, two gill net lifts, and two trap net lifts. All captured fish were measured to the nearest tenth-inch (total length, TL) and released when possible. Weights were estimated from standard length-weight formulas generated from data on file from Indiana natural lakes fish population surveys. Fish scales were taken from largemouth bass and bluegills for age and growth analyses using standard body-length: scale-length relationships.

Submersed aquatic plants were sampled at 20 random littoral sites (Figure 1) using a doublehead rake according to current guidelines. A GPS was used to locate and record sites. Plant abundance, including algae, was quantified at each site by stacking the plants evenly across one side of the rake tines. Scores (0, 1, 3, 5) were assigned to the amount of plants based on increments marked evenly on the tines. Species were then separated and scored individually at each site.

## RESULTS

During the survey, 157 fish weighing 21 pounds were collected. Bluegill were first by number (64%) and weight (39%). Redear were second by number (10%) and fourth by weight (7%). Largemouth bass were third by number (8%) and ranked second by weight (30%). Additional species collected included yellow bullhead, lake chubsucker, warmouth, golden shiner, a brown bullhead, a hybrid sunfish, and a pumpkinseed.

As many as 101 bluegills were collected, ranging in lengths from 1.8 to 8.4 inches and weighing 7.9 pounds. Seventeen were over 6 in. The electrofishing catch rate (240/h) and trap net catch rate (25/lift) were below average when compared to other nearby

natural lakes, but were higher than past surveys. Ages were estimated up to age-6 and growth was average when compared to other nearby natural lakes.

A total of 16 redear, 2.9 to 6.6 inches long, were collected, weighing 1.3 pounds. Twelve of the individuals were between 4 and 5 in, and all were caught in trap nets. Age and growth information were not obtained.

Twelve largemouth bass were collected at Wyland Lake, measuring 2.7 to 17.4 in. Total weight of bass was 6.1 lbs. All but two fish were under 12.0 in TL, measuring 15.3 and 17.4 in. Only two individuals were captured in gill nets, one in trap nets, and nine during electrofishing. Age-1 bass averaged 4.0 in TL, however, not enough individuals were captured to obtain adequate growth information.

Submersed vegetation was found at 100% of the littoral sites, and was present to 20 feet. The overall mean rake score was 3.80. Coontail was the dominant plant, and was found at every sample site. Bladderwort was the second most dominant plant and was found at 30% of the sites. Elodea, water-stargrass, largeleaf pondweed, and filamentous algae were also collected.

## DISCUSSION

Though few fish were captured at Wyland Lake, the recent survey illustrates that there has been a shift in species composition since the winter rotenone application project in 1993. Prior to that project, the lake was dominated by planktivorous fish such as lake chubsuckers and sportfish too small for recreational anglers to keep. Though planktivorous fish are still present at Wyland Lake, their numbers have drastically declined since the previous survey. Consequently, the abundance and overall contribution of sportfish to the overall catch has improved. For example, the 8.4 in bluegill and 17.4 in bass were the largest captured since in 1970. The absence of planktivorous fish have not, however, aided in the improvement of water quality or to the establishment of late-summer trout habitat.

Though largemouth bass have presumably been in Wyland Lake historically, and subsequently stocked by the DFW after the first rotenone treatment in 1971, they had not been recorded in general surveys since 1973 (Table 2). The appearance of bass in greater

numbers and the collection of larger bluegill in 2008 may suggest that the native sportfish population is improving at Wyland Lake.

While sportfish numbers and length frequencies may be improving, rainbow trout stockings should continue on an annual basis to provide more fishing opportunity to anglers. In addition, anglers should be encouraged, via news releases or similar means of public education, to harvest these fish in the spring before summer stratification takes place. Finally, fisheries biologists should continue to monitor the fish population and water quality at Wyland Lake to determine if species composition has changed, or a suitable trout layer has been reestablished.

### RECOMMENDATIONS

- The DFW should continue stocking trout in Wyland Lake while publicizing it as an immediate put and take fishery.
- Fisheries biologists should periodically monitor Wyland Lake to determine if native sportfish populations or water quality parameters change.

### SOURCES CITED

Demott, W.R. 1990. Experimental evaluation of food chain manipulation as a means for preventing algal blooms in lakes. Technical Report 190. Purdue University Water Resources Research Center. West Lafayette, IN.

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Date: 10/27/08

Approved by: Jed Pearson, District Biologists

Approved by: Stu Shipman, Fisheries Supervisor  
Date: 11/9/08

Figure 1. Satellite image of Wyland Lake with submersed aquatic vegetation points and overall rake scores, August 2008.



Table 1. Oxygen concentrations (ppm) at 5 ft intervals and secchi depths at Wyland Lake, 1975-2008.

Depth (ft)	8/75	7/81	8/84	8/85	8/87	8/88	8/90	8/92	8/93	8/08
0	7.4	6.0	6.0	7.0	5.0	4.5	8.0	6.0	5.0	5.4
5	8.2	7.0	5.0	6.0	5.0	4.0	5.0	5.5	5.0	5.3
10	6.8	8.0	3.5	6.0	5.0	1.4	3.0	3.0	4.0	0.5
15	5.2	5.0	2.0	2.5	5.0	0.6	1.5	3.0	1.0	0.8
20	2.4	2.0	1.5	0.5	0.0	1.0	1.4	0.6	2.4	0.5
25	0.6	1.0	tr	tr	tr	0.4	1.2	0.4	2.4	0.1
30	0.2	0.0	0.0	0.0	0.0	0.0	0.4	tr	1.0	0.0
35	0.0	0.0	0.0	0.0	0.0	0.0	tr	tr	0.0	0.0
Secchi	13.0	13.0	9.5	14.5	9.0	13.0	11.0	14.5	12.5	12.5

tr = trace amounts

Table 2. Number of fish collected during fish population surveys at Wyland Lake, 1970-2008.

Species	1970	1973	1988	1990	1992	1993	2008
Bluegill	40	13	141	31	0	32	101
Black bullhead	2	0	0	0	0	0	0
Black crappies	5	0	37	0	0	0	0
Brown bullheads	3	0	0	0	0	0	1
Golden shiners	3	18	26	73	66	441	4
Grass pickerel	2	0	0	3	0	0	0
Green sunfish	1	0	0	0	0	0	0
Hybrid sunfish	0	0	0	0	0	0	1
Lake chubsuckers	10	18	0	27	69	117	6
Largemouth bass	1	7	0	0	0	0	12
Pumpkinseeds	8	0	109	44	102	144	1
Rainbow trout	0	0	0	0	0	0	0
Redear	0	0	0	0	0	0	16
Warmouth	5	0	7	0	0	0	6
Yellow bullheads	13	0	134	0	0	0	9
Yellow perch	2	0	1	0	0	0	0
Total	95	56	455	178	237	734	157
Effort							
Electrofishing (hr)	1.0	1.0	0.38	0.25	0.23	0.25	0.2
Trap nets	6	0	6	2	2	3	2
Gill nets	2	2	4	2	2	2	2

APPENDIX  
Lake Pages

# FISH SURVEY REPORT

Indiana Division of Fish and Wildlife

Type of survey
Initial:      Re-survey: <input checked="" type="checkbox"/>

Lake name	County	Date of survey (Month, day, year)
Wyland Lake	Kosciusco	8/18/2008
Biologist's name	Date of approval (Month, day, year)	
Nate Thomas		

LOCATION		
Quadrangle name	Range	Section
North Webster 33N	7E	2
Township	Nearest town	
Tippecanoe	North Webster	

### ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site			
East side of lake					
Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
6	38	16	97	899	None

### INLETS

Name	Location	Origin
None		

### OUTLET

Name	Location
Unnamed	Intermittent stream in NE corner, flows to Bass Pond
Water level control	
None; intermittent beaver dams.	

POOL	ELEVATION (Feet MSL)	ACRES	Bottom type
TOP OF DAM			Boulder _____
TOP OF FLOOD CONTROL POOL			Gravel _____
TOP OF CONSERVATION POOL			Sand <input checked="" type="checkbox"/>
TOP OF MINIMUM POOL			Muck <input checked="" type="checkbox"/>
			Clay _____
			Marl _____
STREAMBED			

Watershed use
Tir-County Fish and Wildlife area: heavily wooded

Development of shoreline
Undeveloped except for public access site on East shore.

Previous surveys and investigations
Fish population surveys, 1963,1970,1973,1988,1993; Trout evaluation surveys 1979,1980,1981,

SAMPLING EFFORT			
ELECTROFISHING	Day hours	Night hours	Total hours
		0.2	0.2
TRAPS	Number of traps	Days	Total lifts
	2	1	2
GILL NETS	Number of nets	Days	Total lifts
	2	1	2

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color	Turbidity
Clear	12 Feet 6 Inches (Secchi disk)

TEMPERATURE, DISSOLVED OXYGEN (ppm), TOTAL ALKALINITY (ppm), pH							
Depth (ft)	Degrees F	Oxygen*			Depth (ft)	Degrees F	Oxygen*
Surface	74.8	5.4			50		
2	74.8	5.4			52		
4	74.8	5.3			54		
5	74.8	5.3			55		
6	74.7	5.2			56		
8	74.1	2.5			58		
10	72.7	0.5			60		
12	71.6	0.4			62		
14	61.5	0.5			64		
15	59.0	0.8			65		
16	56.7	1.1			66		
18	52.3	0.7			68		
20	48.4	0.5			70		
22	46.0	0.2			72		
24	44.1	0.1			74		
25	43.2	0.1			75		
26	42.6	0.1			76		
28	42.3	0.1			78		
30	41.5	0.0			80		
32	41.4	0.0			82		
34	41.2	0.0			84		
35	41.4	0.0			Sampling date:		
36	41.4	0.0			Surface Bottom		
38					pH		
40					Alkalinity*		
42					Conductivity		
44					TDS		
45							
46							
48							

\*ppm = parts per million

COMMON SPECIES OF AQUATIC PLANTS			
COMMON NAME	SCIENTIFIC NAME	DEPTH (ft)	ABUNDANCE
<b>EMERGENTS</b>			
Arrowhead	<i>Peltandra virginica</i>	to 2'	Common
Cattail	<i>Typha</i> sp.	to 2'	Common
Pickerelweed	<i>Pontederia</i> sp.	to 2'	Common
Spatterdock	<i>Nuphar</i> sp.	to 10'	Abundant
Water lily	<i>Nymphaea</i> sp.	to 10'	Common
Watershield	<i>Brasnia</i> sp.	to 10'	Rare
<b>SUBMERGENTS</b>			
Bladderwort	<i>Utricularia vulgaris</i>	to 4'	Abundant
Coontail	<i>Ceratophyllum demersum</i>	to 20'	Abundant
Elodea	<i>Elodea canadensis</i>	to 8'	Common
Largeleaf pondweed	<i>Potamogeton amplifolius</i>	to 4'	Rare
Water stargrass	<i>Heteranthera dubia</i>	to 15'	Common
Comments Emergent plants dense to 5+ ft deep.			

### Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Wyland	Secchi(ft): 13.0	SE Mean species / site: 0.18
Date: 8/11/2008	Littoral sites with plants: 20	Mean natives / site: 1.75
Littoral Depth (ft): 20.0	Number of species: 5	SE Mean natives / site: 0.18
Littoral Sites: 20	Maximum species / site: 4	Species diversity: 0.62
Total Sites: 20	Mean species / site: 1.75	Native diversity: 0.62

Species	Frequency of	Score Frequency				Dominance
	Occurrence	0	1	3	5	
Coontail	100.0	0.0	25.0	30.0	45.0	68.0
Bladderwort	30.0	70.0	10.0	15.0	5.0	16.0
Elodea spp.	20.0	80.0	15.0	0.0	5.0	8.0
Water-stargrass	20.0	80.0	10.0	10.0	0.0	8.0
Large-leaf pondweed	5.0	95.0	0.0	5.0	0.0	3.0

Filamentous Algae                      0.0

Other species noted:

<b>Relative Abundance, Size and Estimated Weight of Fish Collected at Wyland Lake</b>						
Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Bluegill	101	64.3	1.8	8.4	7.87	38.7
Redear	16	10.2	2.9	6.6	1.33	6.5
Largemouth bass	12	7.6	2.7	17.4	6.13	30.1
Yellow bullhead	9	5.7	7.1	10.2	2.91	14.3
Lake chubsucker	6	3.8	5.5	8.0	0.78	3.8
Warmouth	6	3.8	2.0	5.1	0.44	2.2
Golden shiner	4	2.5	4.3	4.7	0.11	0.5
Brown bullhead	1	0.6	10.2	10.2	0.55	2.7
Hybird sunfish	1	0.6	5.5	5.5	0.12	0.6
Pumpkinseed	1	0.6	5.5	5.5	0.12	0.6
<b>TOTAL</b>	<b>157</b>				<b>20.36</b>	

\*Common names of fishes recognized by the American Fisheries Society.

\*\*Weights estimated from standard length-weight regression models.

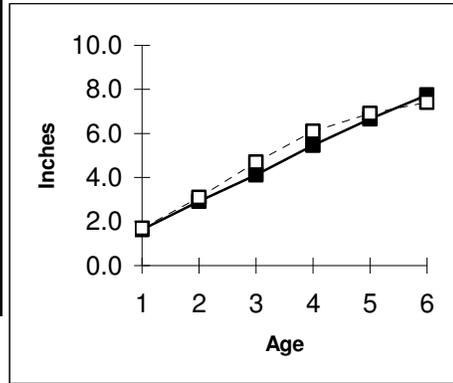


Bluegill  
 Intercept: 0.8 inch

**BACK-CALCULATED LENGTHS (inches) AT EACH AGE**

Year	Class	Count	I	II	III	IV	V	VI
2007		13	1.8					
	stdev		0.3					
2006		15	1.7	3.0				
	stdev		0.3	0.3				
2005		13	1.5	3.0	4.3			
	stdev		0.2	0.4	0.3			
2004		4	1.5	2.8	4.2	5.5		
	stdev		0.1	0.2	0.3	0.3		
2003		7	1.6	2.9	4.0	5.5	6.6	
	stdev		0.2	0.3	0.5	0.5	0.6	
2002		6	1.7	2.9	4.0	5.4	6.7	7.7
	stdev		0.17	0.26	0.44	0.57	0.50	0.60
Mean*			1.6	2.9	4.1	5.5	6.7	7.7
SD			0.2	0.3	0.4	0.5	0.6	0.6
Count			58	45	30	17	13	6

Bluegill growth (solid line) compared to other Indiana natural lakes (dotted line).



\*Does not include age groups with less than three samples.